# Air Resources Board

**John D. Dunlap, III, Chairman**
P.O. Box 2815 · 2020 L Street · Sacramento, California 95812 · www.arb.ca.gov

**Peter M. Rooney**
*Secretary for Environmental Protection*

**Pete Wilson**
*Governor*


October 2, 1998

Dear Sir or Madam:

For more than two years the Air Resources Board (ARB or Board) staff has worked with the public, consumer products manufacturers and other stakeholders to develop the Low Vapor Pressure-Volatile Organic Compounds (LVP-VOC) definition and test method. The current language in ARB Method 310 does not provide for LVP-VOC determination in the antiperspirants and deodorants, consumer products, or aerosol coating products regulations (the California Consumer Products Regulation). As a result, we have proposed modifications to both the California Consumer Products Regulation and ARB Method 310, "Determination of Volatile Organic Compounds (VOC) from Consumer Products," to incorporate a definition of LVP-VOC and analytical methodology.

At its November 19-20, 1998 meeting, the Board will consider adopting modifications to the LVP-VOC definition and Method 310, which includes test procedures for determining LVP-VOC compounds or mixtures. We have prepared a staff report (Initial Statement of Reasons or ISOR) which provides the reasons for the proposed change and a public hearing notice which lists the time, place and date of the public hearing as well as a summary of the proposal. Both these documents are available electronically on the ARB web page and can be downloaded from the Internet at:

**http://www.arb.ca.gov/regact/conspro/lvpvoc/lvpvoc.htm**.

The public hearing notice is enclosed with this letter. You may also request hardcopy of the public hearing notice and staff report by faxing the form on the reverse of this letter to Elizabeth Mongar or Mary Lancaster. Our FAX number is (916) 263-2067.

We appreciate the participation of affected public and industry over the last two years as staff developed the proposed modifications to the California Consumer Products Regulation and ARB Method 310. If you have questions or have further comments please contact George Lew, Chief, Engineering and Laboratory Branch, at (916) 263-1630 or Michael Spears, Manager, Evaluation Section, at (916) 263-1627, respectively.

Sincerely,

William V. Loscutoff, Chief
Monitoring and Laboratory Division

Enclosure--Public Hearing Notice

# Consumer Products Document Request Form

## 1. Check Documents Requesting :

- G **Staff Report - LVP-VOC (Initial Statement of Reasons)**
- G **Board Hearing Notice - November 19-20, 1998**
- G **Reference Test Methods for Method 310**

## 2. Insert your address below :

**_____**

**_____**

**_____**

**_____**

**_____ZIP: _____ - _____**

**Computer Address: _____**

**Voice # (___) ____ - _____ Fax # (___) ____ - _____**

## G Is this a new address?

## 3. FAX or Mail this form to:

**Elizabeth Mongar or Mary Lancaster**
**Air Resources Board**
**Consumer Products**
**P.O. Box 2815**
**Sacramento, CA 95812**

**Fax # (916) 263-2067**

**TITLE 17. CALIFORNIA AIR RESOURCES BOARD**

**NOTICE OF PUBLIC HEARING TO CONSIDER ADOPTION OF MODIFICATIONS TO ARB METHOD 310 TO INCLUDE THE DETERMINATION OF LOW VAPOR PRESSURE-VOLATILE ORGANIC COMPOUNDS (LVP-VOC) IN CONSUMER PRODUCTS**

**AND**

**AMENDMENTS TO THE DEFINITION AND TEST METHOD SECTIONS OF THE CALIFORNIA REGULATIONS TO INCLUDE THE DETERMINATION OF LOW VAPOR PRESSURE-VOLATILE ORGANIC COMPOUNDS (LVP-VOC) IN ANTIPERSPIRANTS AND DEODORANTS, CONSUMER PRODUCTS, AND AEROSOL COATING PRODUCTS**

The Air Resources Board (the Board or ARB) will conduct a public hearing at the time and place noted below to consider the adoption of modifications to the ARB Method 310, "Determination of Volatile Organic Compounds (VOC) in Consumer Products," to include the determination of low vapor pressure-volatile organic compounds (LVP-VOC). At the hearing the Board will also consider the adoption of amendments to the definition and test method sections of the Regulation for Reducing VOC Emissions from Antiperspirants and Deodorants, the Regulation for Reducing VOC Emissions from Consumer Products, and the Regulation for Reducing VOC Emissions from Aerosol Coating Products.

| | |
|---|---|
| Date: | November 19, 1998 |
| Time: | 9:30 a.m. |
| Place: | Air Resources Board<br>Hearing Room, Lower Level<br>2020 L Street<br>Sacramento, California |

This item will be considered at a two-day meeting of the ARB, which will commence at 9:30 a.m., November 19, 1998, and may continue at 8:30 a.m., November 20, 1998. This item may not be considered until November 20, 1998. Please consult the agenda for the meeting, which will be available at least 10 days before November 19, 1998, to determine the day on which this item will be considered.

This facility is accessible to persons with disabilities. If accommodation is needed, please contact ARB's Clerk of the Board at (916) 322-5594, or (800) 700-8326 for TDD calls from outside the Sacramento area by November 5, 1998.

## INFORMATIVE DIGEST OF PROPOSED ACTION AND PLAIN ENGLISH POLICY STATEMENT OVERVIEW

**Sections Affected:** Amendments are being proposed to sections 94506(a), 94506.5, 94508(a)(78), 94515(a), and 94526, Title 17, California Code of Regulations (CCR), in order to revise the definition of LVP-VOC, to modify ARB Method 310, and to incorporate by reference those modifications to ARB Method 310 in the consumer products regulations.

**Background:** Section 41712 of the California Health and Safety Code requires the ARB to adopt regulations to achieve the maximum feasible reduction in reactive organic compounds (ROC) emitted by consumer products ("ROC"is equivalent to "VOC"). To date, the Board has adopted three regulations which establish VOC limits for various categories of consumer products. These regulations are the Regulation for Reducing VOC Emissions from Antiperspirants and Deodorants (the "antiperspirant and deodorant regulation"; sections 94500-94506.5, Title 17, CCR), the Regulation for Reducing VOC Emissions from Consumer Products (the "consumer products regulation"; sections 94507-94517, Title 17, CCR), and the Regulation for Reducing VOC Emissions form Aerosol Coating Products (the "aerosol coatings regulation"; sections 94520-94528, Title 17, CCR).

Each of these regulations contains a section specifying the applicable test methods. The test methods sections of the regulations are section 94506 (antiperspirants and deodorants), section 94515 (consumer products), and section 94526 (the aerosol coating products), Title 17, CCR. These sections incorporate a number of different test methods by reference. Some of the incorporated test methods are used to determine compliance with the applicable VOC limits, and some of the test methods are used to determine other types of compliance.

At its public hearing on November 21, 1996, the Board adopted Resolution 96-57 approving Method 310, "Determination of Volatile Organic Compounds (VOC) in Consumer Products". At this hearing, the Board approved proposed amendments with various modifications to the originally proposed language. Revisions were approved to both Method 310 and to the test methods sections of the regulations specifically stating that Method 310 did not apply to the determination of LVP-VOCs in products. The revisions were adopted on September 25, 1997.

Since adoption of the modifications to the test method in 1997, ARB staff has worked closely with the public, including industry representatives, to develop a definition for LVP-VOC that would be both flexible and technically enforceable.

**Description of the Proposed Regulatory Action:** The ARB staff is proposing revisions to the definition of low vapor pressure-volatile organic compound (LVP-VOC) and to ARB Method 310, "Determination of Volatile Organic Compounds (VOC) in Consumer Products." The proposed amendments to the definition would specify criteria for determining whether compounds or mixtures qualify as LVP-VOCs. These proposed amendments would be used in determining compliance with the applicable VOC limits, and the test methods as modified would be

incorporated by reference in the test methods sections of the ARB regulations for antiperspirants and deodorants, consumer products, and aerosol coating products. The new test methods proposed to be incorporated by reference are ASTM D 86-96 (approved April 10, 1996), ASTM D 850-93 (approved April 15, 1993), ASTM 1078-97 (approved July 10, 1997), and ASTM D 2879-97 (approved April 10, 1997) as modified in Appendix B of ARB Method 310.

A product that initially does not appear to meet the applicable VOC standards may indeed be in compliance because it contains chemical compounds or chemical mixtures that qualify for the LVP-VOC exemption. Under the proposed modifications, if a product appeared not to meet the VOC standards, the Executive Officer would request the product manufacturer or responsible party to supply product formulation data. The Executive Officer currently has broad discretion to verify the accuracy of the formulation data. This includes conducting testing if the boiling point or vapor pressure is unknown. Such testing includes:

1. conducting testing in accordance with ASTM D 86-96 to determine the boiling point.

    a. if the boiling point is greater than 216$^{o}$C, then the sample is an LVP-VOC, and exempt.

    b. if the boiling point is less than 216$^{o}$C, determine if the sample qualifies for partial LVP-VOC status, using the specified procedure.

2. verifying LVP-VOC status by direct measurement of the vapor pressure using ASTM 2879-97, as modified in appendix B of the proposed ARB Method 310.

If a compound or mixture qualifies as an LVP-VOC, recalculate the percent VOC of the product using the formula as specified in Section 4.0 of the ARB Method 310.

Staff proposes changes to section 94506.5 to ensure consistent language with sections 94515 (consumer products regulation) and 94526 (aerosol coatings regulation). Under this section, for purposes of federal enforceability, the US EPA is not subject to approval determinations made by the ARB Executive Officer.

Staff proposes minor revisions to section 94526, subsections (c) and (e). These revisions delete language that is no longer necessary from a previous version of ARB Method 310.

Additionally, staff proposes updating seven reference test methods listed in Section 2 of Method 310 and incorporating them by reference. These reference methods, which have been recertified by ASTM and US EPA on the dates indicated, are the following: ASTM D 859-94 (approved May 15, 1994), ASTM D 2369-97 (approved July 10, 1997), ASTM D 3063-94 (approved November 15, 1994), ASTM D 3074-94 (approved November 15, 1994), ASTM D 3792-91 (approved May 15, 1991), ASTM D 4017-96a (approved July 10, 1996), and US EPA Method 8240B (approved September 1994). Staff also proposes clarifying that three methods referred to in section 94526 are incorporated by reference: ASTM 523-89 (approved March 31, 1989) , ASTM D 1213-91 (approved May 15, 1991), and ASTM D 5043-90 (approved April 27, 1990).

Staff proposes to add USEPA Method 8260B (approved December 1996). This method differs from USEPA Method 8240 by allowing the use of a capillary GC column. Otherwise, the two methods are essentially identical.

Staff proposes to replace the South Coast Air Quality Management District (SCAQMD) Test Method 311 with SCAQMD Test Method 318. Test Method 311 determines the metal content of metallic aerosol coating products and is incorporated by reference in section 94526, subsection (c). In July 1996 the SCAQMD replaced Test Method 311 with Test Method 318, and staff proposes substituting Test Method 318 into section 94526, subsection (c), to be consistent.

Finally, staff proposes conforming revisions to the regulations to be consistent with the proposed modifications to the test method sections.

**Comparable Federal Regulations:** The US EPA has published a final rule, *National Volatile Organic Compound Emission Standards for Consumer Products,* which appeared in the Federal Register on September 11, 1998 (63 Fed. Reg. 48819). The federal rule specifies LVP-VOC criteria for exemption consideration and is similar in this regard to the ARB consumer products regulation. However, the US EPA's rule does not include a test method that is comparable with the proposed modified Method 310. Instead, the US EPA's rule relies predominately on formulation information to demonstrate compliance with its regulation.

The proposed modifications to Method 310 incorporate ASTM test methods by reference, many of which are also incorporated by reference in the Code of Federal Regulations. However, the test methods incorporated in the Code of Federal Regulations are not used in the same manner as described in Method 310 (i.e., the federal test methods are not used to determine LVP-VOC status for consumer products).

## AVAILABILITY OF DOCUMENTS AND CONTACT PERSON

The ARB staff has prepared an Initial Statement of Reasons (ISOR) for the proposed regulatory action which includes a summary of the environmental and economic impacts of the proposal and technical support documentation. Copies of the ISOR may be obtained from the ARB's Public Information Office, 2020 L Street, Sacramento, California 95814, (916) 322-2990, at least 45 days prior to the scheduled hearing. The ISOR contains the full text of the proposed action. The staff has also compiled a record which includes all information upon which the proposal is based. This material is available for inspection upon request to the contact person identified immediately below. The ARB has determined that it is not feasible to draft the regulation in plain English due to the technical nature of the regulation; however, a plain English summary of the regulation is available from the agency contact person named in this notice, and is also contained in the ISOR for this regulatory action.

To obtain this document in an alternative format, please contact the Air Resources Board ADA Coordinator at (916) 322-4505, TDD (916) 324-9531, or (800) 700-8326 for TDD calls

from outside the Sacramento area.

Further inquiries regarding this matter should be directed to George Lew of the Board's Engineering and Laboratory Branch, P.O. Box 2815, Sacramento, California 95812, (916) 263-1630. Further information may also be found by visiting the Internet at:

**http://www.arb.ca.gov/regact/conspro/lvpvoc/lvpvoc.htm**

## COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred in reasonable compliance with the proposed regulatory action are presented below.

The Executive Officer has determined that the proposed regulatory action will not create costs or savings, as defined in Government Code section 11346.5(a)(6), to any state agency or in federal funding to the State, costs or mandate to any local agency or school district whether or not reimbursable by the State pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code, or other nondiscretionary savings to local agencies.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on private persons and businesses. The Executive Officer has determined in accordance with Government Code section 11346.5(a)(8), that the proposed regulatory action will not have a significant adverse economic impact on businesses, including the ability of California businesses to compete with businesses in other states, or, in accordance with Government Code section 11346.5(a)(9), on directly-affected businesses or private persons. In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action will not affect the creation or elimination of jobs within the State of California, the creation of new businesses or the elimination of existing businesses in California, or the expansion of businesses currently doing business within California. In accordance with Government Code section 11346.5(a)(11), the Executive Officer has determined that adoption of the proposed amendments will not have a significant effect on housing costs. An assessment of the economic impacts of the proposed amendments can be found in the ISOR.

The Board's Executive Officer has also determined, pursuant to Government Code section 11346.5(a)(3)(B), that the regulation will affect small business.

Before taking final action on the proposed regulatory action, the ARB must determine that no alternative considered by the agency would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons or businesses than the proposed action.

## SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing. To be considered by the ARB, written submissions must be addressed to and received by the Clerk of the Board, Air Resources Board, P.O. Box, 2815, Sacramento, CA 95812, or 2020 L Street, 5th Floor, Sacramento, CA 95814, no later than 12:00 noon November 18, 1998, or received by the Clerk of the Board at the hearing.

The ARB requests, but does not require, that 20 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing. The ARB encourages members of the public to bring any suggestions for modification of the proposed regulatory action to the attention of staff in advance of the hearing.

## STATUTORY AUTHORITY AND HEARING PROCEDURES

This regulatory action is proposed under the authority granted to the ARB in sections 39600, 39601, 39607, 41511, and 41712 of the Health and Safety Code. This action is proposed to implement, interpret, or make specific sections 39002, 39600, 39607, 40000, 41511, and 41712 of the Health and Safety Code.

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Title 2, Division 3, Part 1, Chapter 3.5 (commencing with section 11340) of the Government Code. Following the public hearing, the ARB may adopt the regulatory language as originally proposed or with nonsubstantial or grammatical modifications. The ARB may also adopt the proposed regulatory language with other modifications if the modifications are sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action. Staff is evaluating whether an additional method, such as ebulliometry or some similar method, could be used to determine vapor pressure. If an additional method is found to be suitable, staff will propose to include it in these modifications. In the event that such modifications are made, the full regulatory text, with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, 2020 L Street, Sacramento, California 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD

Michael P. Kenny
Executive Officer

Date: September 22, 1998

California Environmental Protection Agency

Air Resources Board

# STAFF REPORT

# Initial Statement of Reasons for Proposed Amendments to the Consumer Products Regulations and Modifications to the Test Method to Include Determination of Low Vapor Pressure-Volatile Organic Compounds (LVP-VOC) in Consumer Products

October 2, 1998

Monitoring and Laboratory Division

**PREPARED BY:**

**Wendy A. Howard**
**Monitoring and Laboratory Division**
**Engineering and Laboratory Branch**
**Air Resources Board**

**REVIEWED BY:**

**William V. Loscutoff, Chief, Monitoring and Laboratory Division**
**George Lew, Chief, Engineering and Laboratory Branch**
**Michael P. Spears, Manager, Evaluation Section**

**October 2, 1998**

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# I. INTRODUCTION

The Air Resources Board (ARB or Board) staff proposes to amend the definition and test method sections of the California Consumer Products Regulations which include sections 94500-94506.5 (antiperspirants and deodorants), 94507-94517 (consumer products) and 94520-94528 (aerosol coating products) of Subchapter 8.5, Chapter 1, Division 3, Title 17, California Code of Regulations (CCR). In addition, staff proposes that the Board adopt modifications to Method 310, "The Determination of Volatile Organic Compounds (VOC) in Consumer Products," which would enable the determination of low vapor pressure-volatile organic compounds (LVP-VOC) in consumer products.

The proposed modifications to Method 310 incorporate established analytical test methods based on procedures by the American Society for Testing and Materials (ASTM). In conjunction with current test methods, the additional procedures are proposed for inclusion in Method 310 for determining LVP-VOC content. Method 310 is applicable to a wide variety of consumer products, both providing a calculation procedure for determining VOC content and specifying precision and accuracy for the overall method.

## A. Background

Section 41712 of the California Health and Safety Code requires the ARB to adopt regulations to achieve the maximum feasible reduction in reactive organic compounds (ROC) emitted by consumer products ("ROC"is equivalent to "VOC"). To date, the Board has adopted three regulations which establish VOC limits for various categories of consumer products. These regulations are the Regulation for Reducing VOC Emissions from Antiperspirants and Deodorants (the "antiperspirant and deodorant regulation"; sections 94500-94506.5, Title 17, CCR), the Regulation for Reducing VOC Emissions from Consumer Products (the "consumer products regulation"; sections 94507-94517, Title 17, CCR), and the Regulation for Reducing VOC Emissions from Aerosol Coating Products (the "aerosol coatings regulation"; sections 94520-94528, Title 17, CCR). In addition, the Board has adopted regulations regarding compliance through an alternative control plan for aerosol coatings and consumer products (sections 94540-94555, Title 17, CCR). Staff is not proposing amendments to the alternative control plan provision.

Each of these regulations contains a section specifying the applicable test methods. The test method sections of the regulations are section 94506 (antiperspirants and deodorants), section 94515 (consumer products), and section 94526 (the aerosol coating products), Title 17, CCR. These sections incorporate a number of different test methods by reference. Some of the incorporated test methods are used to determine compliance with the applicable VOC limits, and some of the test methods are used to determine other types of compliance.

At its November 21, 1996 public hearing, the Board adopted Resolution 96-57 approving Method 310, "Determination of Volatile Organic Compounds (VOC) in Consumer Products." At this hearing, the Board approved proposed amendments with various modifications to the originally proposed language. Revisions were approved to both Method 310 and to the test methods sections of the ARB regulations referenced above. The modifications to Method 310 clarified that Method

310 did not apply to the determination of LVP-VOCs in products. Various other clarifications were also made, and references to LVP-VOC test methods were deleted in order to be consistent with the modifications. The revisions were adopted by the Board on September 25, 1997.

Since adoption of the modifications to the test methods in 1997, ARB staff has worked closely with the public, including industry representatives, to develop a definition for LVP-VOC and to specify test procedures for determining LVP-VOC that would be both flexible and technically enforceable.

**Legal Authority**

This regulatory action is proposed under the authority granted to the ARB in sections 39600, 39601, 39607, 41511, and 41712 of the Health and Safety Code. Sections 39600 and 39601 authorize the ARB to adopt regulations and do such acts as may be necessary for the proper execution of the powers and duties granted to and imposed upon the ARB. Section 39607(d) authorizes the ARB to adopt test procedures to measure compliance with its non-vehicular emission standards. Section 41511 authorizes the ARB to adopt regulations requiring air pollution emission sources to take such action as the ARB determines to be reasonable to determine emissions from such sources. Finally, section 41712 authorizes the ARB to adopt regulations to achieve the maximum feasible reduction in VOC emitted by consumer products.

Pursuant to these sections, the ARB has previously adopted a number of consumer products test methods. Test methods are an integral part of the ARB consumer products regulations and are necessary to determine and verify compliance with the regulatory standards.

**Comparable Federal Regulations**

The US EPA has published a final rule, *National Volatile Organic Compound Emission Standards for Consumer Products*, which appeared in the Federal Register on September 11, 1998 (63 Fed. Reg. 48819). The federal rule specifies LVP-VOC criteria for exemption consideration and is similar in this regard to the ARB consumer products regulation. However, the US EPA's rule does not include a test method that compares with the proposed revisions of Method 310. Instead, the US EPA's rule relies predominantly on formulation information to demonstrate compliance with its regulation.

Whenever possible, the ARB avoids unnecessary duplication and conflict with federal regulations addressing the same issues. Method 310 assists the ARB's enforcement determinations and with the proposed modifications will better allow for accurate information to be generated when a manufacturer's formulation data is unavailable or incomplete.

The proposed modifications to Method 310 incorporate ASTM test methods by reference, many of which are also incorporated by reference in the Code of Federal Regulations. However, the test methods incorporated in the Code of Federal Regulations are not used in the same manner as described in Method 310 (i.e., the federal test methods are not used to determine LVP-VOC status for consumer products).

## B. Public Process

Staff participated in several teleconferences with industry representatives on various issues relating to the proposed modifications to the LVP-VOC definition and Method 310, including a description of the proposed procedures for determining the LVP-VOC content of a consumer product and the manner in which data would be reported. All of this information is available to the public via the Internet at:

**http://www.arb.ca.gov/regact/conspro/lvpvoc/lvpvoc.htm**

In April 1998, staff initiated a round-robin study of the proposed test methods that would be included in the proposed modifications to Method 310 to obtain interlaboratory precision and accuracy data. The results of the round-robin analysis are currently available on the Internet.

A workshop was held July 22, 1998 to discuss the proposed modifications to Method 310 and proposed amendments to the definition of LVP-VOC. To maximize public participation, the workshop was scheduled and coordinated with workshops on other consumer products issues conducted by ARB's Stationary Source Division.

Following the July 22 workshop, staff received an electronic mail message from The Dow Chemical Company (Appendix C) suggesting that the term "heavy atoms" be substituted for "carbon atoms," in part B of the proposed definition. The comment stated that some chemical compounds and mixtures currently being used would no longer qualify under the proposed language. Specific chemicals named were ethylene glycol 200 and triisopropanolamine. ARB staff proposes no change of the current proposed language since the specific chemical compounds referred to meet criteria in the definition, thus qualifying as LVP-VOC. Staff believes the term "heavy atom" is ambiguous.

A comment letter, dated August 18, 1998, was received from the United States Environmental Protection Agency (US EPA), Region IX (Appendix C). The US EPA commented on the fact that there was no language in section 94506 to state that US EPA is not subject to approval determinations made by the ARB Executive Officer. Staff reviewed sections 94506 and 94506.5 (Federal Enforceability), and proposes to amend section 94506.5 to make Executive Officer decisions made under section 94506 consistent with the Federal enforceability provisions governing the other two consumer products test method sections, 94515 and 94526. For purposes of federal enforceability, the US EPA is not subject to approvals made by the ARB Executive Officer. In response to another US EPA comment, staff is presently conducting testing to determine the accuracy of the test methods prior to adoption for general use.

Staff received a letter from Exxon dated August 4, 1998 (Appendix C). The letter stated that "the overall approach appeared to be scientifically sound with reasonable flexibility for practical implementation."

## C. Incorporation by Reference

Because of their length and complexity, staff proposes that the following test procedures be incorporated by reference into ARB Method 310 which in turn is incorporated by reference in sections 94506, 94515, and 94526, Title 17, CCR:

1. ASTM D 86-96 (approved April 10, 1996) Standard Test Method for Distillation of Petroleum Products

2. ASTM D 850-93 (approved April 15, 1993) Standard Test Method for Distillation of Industrial Aromatic Hydrocarbons and Related Materials

3. ASTM D 1078-97 (approved July 10, 1997) Standard Test Method for Distillation Range of Volatile Organic Liquids

4. ASTM D 2879-97 (approved April 10, 1997) Standard Test Method for Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope, as modified in the proposed Appendix B of ARB Method 310.

5. US EPA Method 8260B (revision 2, December 1996) Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy (GC/MS)

Staff proposes that the following test procedures, which were previously incorporated by reference, be updated to reflect recertification by ASTM, US EPA and SCAQMD:

1. ASTM D 859-94 (reapproved May 15, 1994) Standard Test Method for Silica in Water

2. ASTM D 2369-97 (reapproved July 10, 1997) Standard Test Method for Volatile Content of Coatings

3. ASTM D 3063-94 (reapproved November 15, 1994) Standard Test Methods for Pressure in Glass Aerosol Bottles with the modifications found in Appendix A of Method 310

4. ASTM D 3074-94 (reapproved November 15, 1994) Standard Test Methods for Pressure in Metal Aerosol Containers with the modifications found in Appendix A of Method 310

5. ASTM D 3792-91 (reapproved May 15, 1991) Standard Test Method for Water Content of Water-Reducible Paints by Direct Injection Into a Gas Chromatograph

6. ASTM D 4017-96a (reapproved July 10, 1996) Standard Test Method for Water in Paints and Paint Materials by the Karl Fisher Titration Method

7. US EPA Method 8240B (revision 2, September 1994) Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

8. SCAQMD Test Method 318-95 (approved July 1996) Determination of Weight Percent Elemental Metal in Coatings by X-ray Diffraction

Staff also proposes clarifying that three methods referred to in section 94526 are incorporated by reference: ASTM 523-89 (approved March 31, 1989), ASTM D 1213-91 (approved May 15, 1991), and ASTM D 5043-90 (approved April 27, 1990).

## D. Recommendations

Staff recommends that the Board adopt the proposed amendments to Title 17 of the California Code of Regulations and the proposed modifications to Method 310. The full text of the proposed amendments and modifications is shown in Appendix A and in Appendix B to this report.

## II. PROPOSED MODIFICATIONS TO ARB METHOD 310 AND AMENDMENTS TO THE CONSUMER PRODUCTS REGULATIONS

### A. Introduction

This Chapter provides the Plain English discussion of the proposed amendments to the definition of LVP-VOC and the test method sections of the antiperspirant and deodorant, consumer products, and aerosol coatings regulations, along with modifications to Method 310. This discussion is intended to satisfy the requirements of Government Code 11346.2(a)(1), which requires that a non-controlling "Plain English" summary of a regulation that affects small business be made available to the public.

### B. Existing Definition

The current definition for an LVP-VOC does not clearly provide the criteria necessary to determine an exemption for a consumer product.

### C. Existing Test Method

The ARB currently uses Method 310 for analysis of consumer products in California. Method 310 includes ASTM, US EPA and NIOSH procedures, which are referenced in sections 94506, 94515, and 94526 of Title 17, CCR.

However, the ARB Method 310 currently does not contain procedures that allow for the determination of the LVP-VOC status of a consumer product. At its November 21, 1996 public hearing, the Board approved Method 310, “Determination of Volatile Organic Compounds (VOC) in Consumer Products,” (subsequently adopted by executive order G-97-065 dated September 25, 1997). At this hearing, the Board approved proposed amendments with modifications to the staff’s initially proposed language. Modifications approved to both Method 310 and to the test methods sections of the ARB regulations referenced above clarified that Method 310 did not apply to the determination of LVP-VOC status in a consumer product. Other clarifications were made, and references to LVP-VOC test methods were deleted in order to be consistent with the modifications.

### D. Proposed Modified Method 310

Staff proposes that the Board adopt modified Method 310 for the antiperspirant regulation, consumer product regulation, and aerosol coating regulation (Appendix A contains the text of the proposed amendments to the regulation). The primary proposed modification to Method 310 adds a procedure for determining LVP-VOC in consumer products by utilizing the following testing procedures, which are to be incorporated by reference:

1. ASTM D 86-96 (approved April 10, 1996) Standard Test Method for Distillation of Petroleum Products

2. ASTM D 850-93 (approved April 15, 1993) Standard Test Method for Distillation of Industrial Aromatic Hydrocarbons and Related Materials

3. ASTM D 1078-97 (approved July 10, 1997) Standard Test Method for Distillation Range of Volatile Organic Liquids

4. ASTM D 2879-97 (approved April 10, 1997) Standard Test Method for Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope, as modified in the proposed Appendix B of ARB Method 310.

5. US EPA Method 8260B (revision 2, December 1996) Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy (GC/MS)

These ASTM procedures expand Method 310's capability to determine LVP-VOC status, increasing the applicability and flexibility in determining the VOC content from the various consumer product categories. These overall changes will improve the quality of the data, ensuring confidence in the results from Method 310.

In addition, minor changes to Section 2 of Method 310 were made to reflect updates of ASTM and US EPA methods previously incorporated by reference. Also, staff has proposed to add US EPA Method 8260B. This method differs from US EPA Method 8240 by allowing the use of a capillary GC column. Otherwise, the two methods are essentially identical.

**Alternate Test Methods**

To provide additional flexibility to the consumer products industry, Method 310 allows the ARB Executive Officer to approve alternate test methods as long as the alternate methods are found to accurately determine the concentration of VOC or other constituents in a consumer product.

**Description of Proposed Modifications to Method 310**

The dashed boxes in Figure 1 show how the proposed modifications are incorporated into Method 310. Table 1 references the appropriate ASTM procedures for LVP-VOC status determination. The ARB Executive Officer[1] collects consumer product samples throughout the State for analysis. After the sample analysis is completed, the Executive Officer makes an initial determination of the VOC content using the appropriate formula as specified in Section 4.0 of the method.

A product that initially does not appear to meet the applicable VOC standards may indeed be in compliance because it contains chemical compounds or chemical mixtures that qualify for the LVP-VOC exemption. When a product does not appear to meet the VOC standards, the

1. The term ARB Executive Officer means the Executive Officer of the Air Resources Board or his or her authorized representative.

Executive Officer will request the product manufacturer or responsible party to supply product formulation data. Formulation data submitted to the ARB Executive Officer may be claimed as confidential: such information will be handled in accordance with the confidentiality procedures specified in Title 17, CCR, sections 91000 to 91022. Once the formulating data is received by the Executive Officer, Method 310 allows the Executive Officer broad discretion to verify the accuracy of the formulation data. This includes testing if the boiling point or vapor pressure is unknown. Such testing includes:

1. conducting testing in accordance with ASTM D 86-96 to determine the boiling point.

    a. if the boiling point is greater than 216$^{o}$ C, then the sample is an LVP-VOC, and exempt.

    b. if the boiling point is less than 216$^{o}$ C, determine if the sample qualifies for partial LVP-VOC status. That portion of the sample which boils greater than 216$^{o}$ C would be considered LVP-VOC. In practice the Executive Officer would determine what amount qualifies as an LVP-VOC by taking the first distillation cut above 216$^{o}$ C, to the nearest 5 percent.

2. verifying LVP-VOC status by direct measurement of the vapor pressure using ASTM 2879-97, as modified in appendix B of the proposed ARB Method 310, for chemical compounds or mixtures that have a vapor pressure less than 0.1 mm Hg and a boiling point less than 216$^{o}$ C.

If a compound or mixture qualifies as an LVP-VOC, the Executive Officer will recalculate the percent VOC of the product using the formula specified in Section 4.0 of the ARB Method 310.

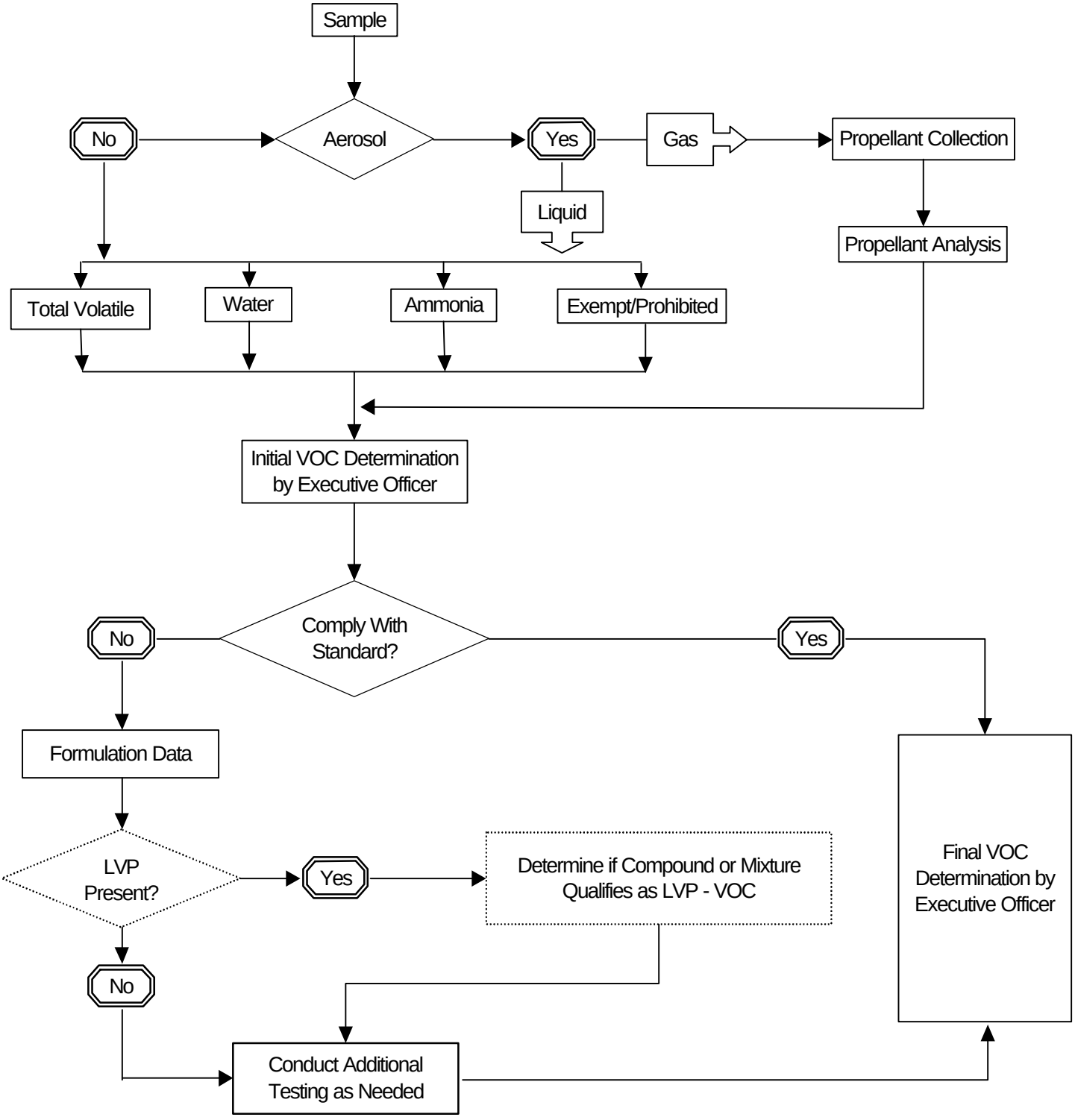


Figure 1: Flow Chart of Analysis via Method 310 (as proposed)

| Table 1: Method 310 LVP-VOC Reference Methods (as proposed) | |
|---|---|
| **Analysis to be Performed** | **Reference Method** |
| LVP-VOC | ASTM D 86-96; ASTM D 850-93; ASTM D 1078-97; ASTM D 2879-97 (as modified) |
| | |

**E. Amendments to the Existing Test Methods Regulations**

As noted above, staff proposes amendments to the test method sections of the antiperspirant/deodorant regulation, the consumer products regulation, and the aerosol coatings regulation. The amendments incorporate modifications to Method 310.

Staff proposes changes to section 94506.5 to ensure consistent language with sections 94515 (consumer products regulation) and 94526 (aerosol coatings regulation). Under this section, for purposes of federal enforceability, the US EPA is not subject to approval determinations made by the ARB Executive Officer.

Staff proposes minor revisions to section 94526, subsections (c) and (e). These revisions delete language that is no longer necessary from a previous version of ARB Method 310.

Minor changes to Section 2 of Method 310 are recommended to reflect the recertification of ASTM and US EPA methods previously incorporated by reference. Also, staff has proposed to add US EPA Method 8260B. This method differs from US EPA Method 8240 by allowing the use of a capillary GC column. Otherwise, the two methods are essentially identical.

Additionally, staff proposes to replace the South Coast Air Quality Management District (SCAQMD) Test Method 311 with SCAQMD Test Method 318. Test Method 311 determines the metal content of metallic aerosol coating products and is incorporated by reference in section 94526, subsection (c). In July 1996 the SCAQMD replaced Test Method 311 with Test Method 318, and staff proposes adopting Test Method 318 into section 94526, subsection (c), to be consistent.

Finally, staff proposes conforming revisions to the regulations to be consistent with proposed modifications to the test method sections.

## F. Amendments to the Definition of LVP-VOC

The staff proposed four revisions to the LVP-VOC definition. The first revision defines the difference between a chemical compound (pure material) and a chemical mixture. The second revision defines a compound or mixture having a boiling point greater than $216^{o}$ C as an LVP-VOC. This is based on n-dodecane, a twelve carbon chemical compound, having a boiling point of $216^{o}$ C. With the boiling point defined, the third revision provides for the determination of partial LVP-VOC exemption to the nearest 5 percent. The fourth revision specifies a vapor pressure test method used to determine if a compound or mixture qualifies as an LVP-VOC.

## III. AIR QUALITY, ENVIRONMENTAL, AND ECONOMIC IMPACTS

### A. Introduction

This Chapter discusses the air quality, environmental, and economic concerns, as well as the alternatives to the proposed modified test method and regulatory amendments.

### B. Air Quality and Environmental Impacts

Both the California Environmental Quality Act (CEQA) and Board policies require the ARB to consider the potential environmental impacts of proposed regulations. Method 310 is fundamentally a mechanism for determining compliance with the VOC regulatory standards. The modifications to Method 310 will not result in any air quality impacts because the VOC standards for consumer products will remain the same and the method is simply for ascertaining LVP-VOC status. Also, the Executive Officer has not identified adverse air quality environmental impacts that would result from the proposed regulatory action. The Executive Officer has therefore concluded that the proposed regulatory action will not have any significant adverse impacts on the environment.

### C. Economic Impacts

In developing this regulatory proposal, the Executive Officer evaluated the potential economic impacts on private persons and businesses. State law (Government Code sections 11346.3 and 11346.5) requires such an economic analysis. Government Code section 11346.3(a) requires that in proposing to adopt or amend an administrative regulation, state agencies must assess the potential for adverse economic impact on California business enterprises and individuals. The assessment must include the impact of the proposal on the ability of California businesses to compete with businesses in other states. In addition, Government Code section 11346.3(b) requires state agencies to assess the potential impact of proposed regulations on the creation or elimination of jobs in California, the creation of new businesses and the elimination of existing businesses in California, or the expansion of businesses currently doing business within California. Government Code section 11346.5(a)(9) also requires that the potential cost impact be considered on private persons or businesses directly affected by the proposed regulation.

The effect of the proposed regulatory action will be to modify the existing ARB Method 310. Method 310 is being used by the Executive Officer to test samples of consumer products to determine if they comply with the applicable VOC standards. Manufacturers are already required to comply with these standards, which will not be changed by the proposed action. The proposed action will impose no additional requirements on any person to do any act or to refrain from doing any act. No costs will be imposed on the regulated community.

The Executive Officer has therefore determined that the proposed regulatory action will not have a significant adverse economic impact on the ability of California businesses to compete with businesses in other states or on directly-affected private persons. In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed

regulatory action will not affect the creation or elimination of jobs within the State of California, the creation of new businesses and the elimination of existing business in California, or the expansion of businesses currently doing business within California. In accordance with Government Code section 11346.5 (a) (11), the Executive Officer has determined that adoption of the proposed amendments will not have a significant effect on housing costs.

The Board's Executive Officer has also determined, pursuant to Government Code section 11346.5(a)(3)(B), that the regulation will affect small business. This determination was made because California regulations provide that a proposed regulation "affects small business" if a small business "derives a benefit . . . or incurs a detriment from the enforcement of the regulation" (see Title 1, California Code of Regulations, section 4(a)). This definition is so broadly worded that it is possible to conceive of some scenario in which a small business might "derive a benefit or incur a detriment" from the proposed regulatory action.

## D. Alternatives Considered

In developing the modifications to ARB Method 310 and the proposed amendments to the consumer products regulations, staff considered the following two alternatives:

1. Retain the current regulations: This provides the ability to analyze consumer products, but is limited in scope as there is no common test method to determine the LVP-VOC status as defined in the proposed regulations.

2. Adopt the modified Method 310 and the proposed amendments: ARB Method 310, as modified, along with the amendments, integrates the reference methods by including additional test methods to expand applicability, and allows for maximum ability to measure the components of consumer products. Overall, the modified Method 310 and amendments provide a mechanism which clearly defines an LVP-VOC, and are both technically enforceable and flexible to those who must comply, without reducing the quality of the test results.

INITIAL STATEMENT OF REASONS

# APPENDIX A

Proposed Amendments to the Definition of LVP-VOC and the Test Methods Sections of the Consumer Products Regulations

**California Environmental Protection Agency**
**AIR RESOURCES BOARD**

**Proposed Amendments to Consumer Products Regulations and Modifications to ARB Method 310**

## Initial Statement of Reasons

# APPENDIX A

## Proposed Amendments to the Definition of LVP-VOC and the Test Methods Sections of the Consumer Products Regulations

[Note: The text proposed for deletion is shown in **~~bold/strikeout~~** and the new text is shown in **bold/underline**] This amendment proposes modifications to ARB Method 310 incorporated in the consumer products regulation.

**Amend Section 94508(a)(78), Title 17, California Code of Regulations, to read as follows:**

**§94508. Definitions**.

(a) For the purpose of this article, the following definitions apply:

**....**

(78) "LVP-VOC" means **a chemical "compound" or "mixture"** **~~any compound~~** which contains at least one carbon atom and **meets one** **~~has either~~** of the following:

(A) **has** a vapor pressure less than 0.1 mm Hg at 20$^{\circ}$ C, **~~or~~** **as determined by ARB Method 310; or**

(B) **is a chemical "compound" with more than 12 carbon atoms, or a chemical "mixture" comprised solely of "compounds" with more than 12 carbon atoms, and the vapor pressure is unknown; or** **~~more than 12 carbon atoms, if the vapor pressure is unknown.~~**

**(C) is a chemical "compound" with a boiling point greater than 216$^{\circ}$ C, as determined by ARB Method 310; or**

**(D) is the weight percent of a chemical "mixture" that boils above 216$^{\circ}$ C, as determined by ARB Method 310.**

**For the purposes of the definition of LVP-VOC, chemical "compound" means a molecule of definite chemical formula and isomeric structure, and chemical "mixture" means a substance comprised of two or more chemical "compounds".**

**....**

**Amend Section 94506(a), Title 17, California Code of Regulations to read as follows:**

**§94506. Test Methods.**

(a)(1) Testing to determine the volatile organic compound content of an antiperspirant or deodorant, or to determine compliance with the requirements of this article, shall be

performed using Air Resources Board Method 310, Determination of Volatile Organic Compounds (VOC) in Consumer Products, adopted ~~9/25/97~~ **September 25, 1997 and as last amended on (date)**, which is incorporated herein by reference. Alternative methods which are shown to accurately determine the concentration of VOC in a subject product or its emissions may be used upon approval of the Executive Officer.

(2) In sections 3.5 and ~~3.6~~ **3.7** of Air Resources Board (ARB) Method 310, a process is specified for the "Initial Determination of VOC Content" and the "Final Determination of VOC Content". This process is an integral part of testing procedures set forth in ARB Method 310, and is reproduced below:

Sections 3.5 and ~~3.6~~ **3.7** of Air Resources Board Method 310

3.5 *Initial Determination of VOC Content*. The Executive Officer will determine the VOC content pursuant to sections 3.2 and 3.3. Only those components with concentrations equal to or greater than 0.1 percent by weight will be reported.

3.5.1 Using the appropriate formula specified in section 4.0, the Executive Officer will make an initial determination of whether the product meets the applicable VOC standards specified in ARB regulations. If initial results show that the product does not meet the applicable VOC standards, the Executive Officer may perform additional testing to confirm the initial results.

3.5.2 If the results obtained under section 3.5.1 show that the product does not meet the applicable VOC standards, the Executive Officer will request the product manufacturer or responsible party to supply product formulation data. The manufacturer or responsible party shall supply the requested information. Information submitted to the ARB Executive Officer may be claimed as confidential; such information will be handled in accordance with the confidentiality procedures specified in Title 17, California Code of Regulations, sections 91000 to 91022.

3.5.3 If the information supplied by the manufacturer or responsible party shows that the product does not meet the applicable VOC standards, then the Executive Officer will take appropriate enforcement action.

3.5.4 If the manufacturer or responsible party fails to provide formulation data as specified in section 3.5.2, the initial determination of VOC content under this section 3.5 shall determine if the product is in compliance with the applicable VOC standards. This determination may be used to establish a violation of ARB regulations.

3.**7**~~6~~ *Final Determination of VOC Content*. If a product's compliance status is not satisfactorily resolved under section**s** 3.5 **and 3.6**, the Executive Officer will conduct further analyses and testing as necessary to verify the formulation data.

3.**7**6.1 If the accuracy of the supplied formulation data is verified and the product sample is determined to meet the applicable VOC standards, then no enforcement action for violation of the VOC standards will be taken.

3.**7**6.2 If the Executive Officer is unable to verify the accuracy of the supplied formulation data, then the Executive Officer will request the product manufacture or responsible party to supply information to explain the discrepancy.

3.**7**6.3 If there exists a discrepancy that cannot be resolved between the results of Method 310 and the supplied formulation data, then the results of Method 310 shall take precedence over the supplied formulation data. The results of Method 310 shall then determine if the product is in compliance with the applicable VOC standards, and may be used to establish a violation of ARB regulations.

**Amend Section 94506.5, Title 17, California Code of Regulations, to read as follows:**

**§94506.5. Federal Enforceability.**

For purposes of federal enforceability of this article, the Environmental Protection Agency is not subject to approval determinations made by the Executive Officer under Sections 94503.5 and 94505 **and 94506**. Within 180 days of a request from a person who has been granted an exemption or variance under Section 94503.5 or 94505, an exemption or variance meeting the requirements of the Clean Air Act shall be submitted by the Executive Officer to the Environmental Protection Agency for inclusion in the applicable implementation plan approved or promulgated by the Environmental Protection Agency pursuant to Section 110 of the Clean Air Act, 42 U.S.C., Section 7410. Prior to submitting an exemption granted under Section 94503.5 as a revision to the applicable implementation plan, the Executive Officer shall hold a public hearing on the proposed exemption. Notice of the time and place of the hearing shall be sent to the applicant by certified mail not less than 30 days prior to the hearing. Notice of the hearing shall also be submitted for publication in the California Regulatory Notice ~~**Requestor**~~ **Register** and sent to the Environmental Protection Agency, every person who requests such notice, and to any person or group of persons whom the Executive Officer believes may be interested in the application. Within 30 days of the hearing the Executive Officer shall notify the applicant of the decision in writing as provided in Section 94503.5(f). The decision may approve, disapprove, or modify an exemption previously granted pursuant to Section 94503.5.

**Amend Section 94515(a), Title 17, California Code of Regulations, to read as follows:**

**§94515. Test Methods.**

(a)(1) VOC content determination using ARB Method 310. Testing to determine compliance with the requirements of this article~~,~~ shall be performed using Air Resources Board Method 310, Determination of Volatile Organic Compounds (VOC) in Consumer

Products, adopted ~~9/25/97~~ **September 25, 1997 and as last amended on (date)**, which is incorporated herein by reference. Alternative methods which are shown to accurately determine the concentration of VOCs in a subject product or its emissions may be used upon approval of the Executive Officer.

(2) In sections 3.5**,** ~~**and**~~ 3.6**, and 3.7** of Air Resources Board (ARB) Method 310, a process is specified for the "Initial Determination of VOC Content" and the "Final Determination of VOC Content". This process is an integral part of testing procedures set forth in ARB Method 310, and is reproduced below:

Sections 3.5**,** ~~**and**~~ 3.6**, and 3.7** of Air Resources Board Method 310

3.5 *Initial Determination of VOC Content.* The Executive Officer will determine the VOC content pursuant to sections 3.2 and 3.3. Only those components with concentrations equal to or greater than 0.1 percent by weight will be reported.

3.5.1 Using the appropriate formula specified in section 4.0, the Executive Officer will make an initial determination of whether the product meets the applicable VOC standards specified in ARB regulations. If initial results show that the product does not meet the applicable VOC standards, the Executive Officer may perform additional testing to confirm the initial results.

3.5.2 If the results obtained under section 3.5.1 show that the product does not meet the applicable VOC standards, the Executive Officer will request the product manufacturer or responsible party to supply product formulation data. The manufacturer or responsible party shall supply the requested information. Information submitted to the ARB Executive Officer may be claimed as confidential; such information will be handled in accordance with the confidentiality procedures specified in Title 17, California Code of Regulations, sections 91000 to 91022.

3.5.3 If the information supplied by the manufacturer or responsible party shows that the product does not meet the applicable VOC standards, then the Executive Officer will take appropriate enforcement action.

3.5.4 If the manufacturer or responsible party fails to provide formulation data as specified in section 3.5.2, the initial determination of VOC content under this section 3.5 shall determine if the product is in compliance with the applicable VOC standards. This determination may be used to establish a violation of ARB regulations.

**3.6 Determination of the LVP-VOC status of compounds and mixtures. This section does not apply to antiperspirant and deoderants or aerosol coatings products because there is no LVP-VOC exemption for these products.**

**3.6.1** **Formulation data. If the vapor pressure is unknown, the following ASTM methods will be used to determine the LVP-VOC status of compounds and mixtures: ASTM D 86-96 (approved April 10, 1996), ASTM D 850-93 (approved April 15, 1993), ASTM D 1078-97 (approved July 10, 1997), and ASTM D 2879-97 (approved April 10, 1997), as modified in Appendix B to this Method 310.**

**3.6.2** **LVP-VOC status of "compounds" or "mixtures." The Executive Officer will test a sample of the LVP-VOC used in the product formulation to determine the boiling point for a compound or for a mixture. If the boiling point exceeds 216° C, the compound or mixture is an LVP-VOC. If the boiling point is less than 216° C, then the weight percent of the mixture which boils above 216° C is an LVP-VOC. The Executive Officer will use the nearest 5 percent distillation cut that is greater than 216° C as determined under 3.6.1 to determine the percentage of the mixture qualifying as an LVP-VOC.**

**3.6.3** **Reference method for identification of LVP-VOC compounds and mixtures. If a product does not qualify as an LVP-VOC under 3.6.2, the Executive Officer will test a sample of the compound or mixture used in a products formulation utilizing ASTM D 2879-97, as modified in Appendix B to ARB Method 310, to determine if the compound or mixture meets the requirements of Title 17, CCR, section 94508 (78)(A).**

3.**7**6 *Final Determination of VOC Content*. If a product's compliance status is not satisfactorily resolved under section**s** 3.5 **and 3.6**, the Executive Officer will conduct further analyses and testing as necessary to verify the formulation data.

3.**7**6.1 If the accuracy of the supplied formulation data is verified and the product sample is determined to meet the applicable VOC standards, then no enforcement action for violation of the VOC standards will be taken.

3.**7**6.2 If the Executive Officer is unable to verify the accuracy of the supplied formulation data, then the Executive Officer will request the product manufacture or responsible party to supply information to explain the discrepancy.

3.**7**6.3 If there exists a discrepancy that cannot be resolved between the results of Method 310 and the supplied formulation data, then the results of Method 310 shall take precedence over the supplied formulation data. The results of Method 310 shall then determine if the product is in compliance with the applicable VOC standards, and may be used to establish a violation of ARB regulations.

**Amend Section 94526, Title 17, California Code of Regulations, to read as follows:**

**§94526. Test Methods.**

Compliance with the requirements of this article shall be determined by using the following test methods, which are incorporated by reference herein. Alternative test methods which are shown to accurately determine the VOC content, exempt compound content, metal content, specular gloss, or acid content may also be used after approval in writing by the Executive Officer:

(a)(1) VOC Content. The VOC content of all aerosol coating products subject to the provisions of this article shall be determined by the procedures set forth in "Air Resources Board Method 310, Determination of Volatile Organic Compounds (VOC) in Consumer Products," adopted ~~**9/25/97**~~ **September 25, 1997 and as last amended on (date)**.

(2) In sections 3.5 and ~~**3.6**~~ **3.7** of Air Resources Board (ARB) Method 310, a process is specified for the "Initial Determination of VOC Content" and the "Final Determination of VOC Content". This process is an integral part of testing procedures set forth in ARB Method 310, and is reproduced below:

Sections 3.5 and ~~**3.6**~~ **3.7** of Air Resources Board Method 310

3.5 *Initial Determination of VOC Content*. The Executive Officer will determine the VOC content pursuant to sections 3.2 and 3.3. Only those components with concentrations equal to or greater than 0.1 percent by weight will be reported.

3.5.1 Using the appropriate formula specified in section 4.0, the Executive Officer will make an initial determination of whether the product meets the applicable VOC standards specified in ARB regulations. If initial results show that the product does not meet the applicable VOC standards, the Executive Officer may perform additional testing to confirm the initial results.

3.5.2 If the results obtained under section 3.5.1 show that the product does not meet the applicable VOC standards, the Executive Officer will request the product manufacturer or responsible party to supply product formulation data. The manufacturer or responsible party shall supply the requested information. Information submitted to the ARB Executive Officer may be claimed as confidential; such information will be handled in accordance with the confidentiality procedures specified in Title 17, California Code of Regulations, sections 91000 to 91022.

3.5.3 If the information supplied by the manufacturer or responsible party shows that the product does not meet the applicable VOC standards, then the Executive Officer will take appropriate enforcement action.

3.5.4 If the manufacturer or responsible party fails to provide formulation data as specified in section 3.5.2, the initial determination of VOC content under this section 3.5 shall determine if the product is in compliance with the applicable VOC standards. This determination may be used to establish a violation of ARB regulations.

3.**7**~~6~~ *Final Determination of VOC Content*. If a product's compliance status is not satisfactorily resolved under section**s** 3.5 **and 3.6**, the Executive Officer will conduct further analyses and testing as necessary to verify the formulation data.

3.**7**~~6~~.1 If the accuracy of the supplied formulation data is verified and the product sample is determined to meet the applicable VOC standards, then no enforcement action for violation of the VOC standards will be taken.

3.**7**~~6~~.2 If the Executive Officer is unable to verify the accuracy of the supplied formulation data, then the Executive Officer will request the product manufacture or responsible party to supply information to explain the discrepancy.

3.**7**~~6~~.3 If there exists a discrepancy that cannot be resolved between the results of Method 310 and the supplied formulation data, then the results of Method 310 shall take precedence over the supplied formulation data. The results of Method 310 shall then determine if the product is in compliance with the applicable VOC standards, and may be used to establish a violation of ARB regulations.

(b) Exempt Compounds. Compounds exempt from the definition of VOC shall be analyzed according to the test methods listed below:

(1) the exempt compound content of all aerosol coating products shall be determined by "Air Resources Board Method 310, Determination of Volatile Organic Compounds (VOC) in Consumer Products," adopted ~~9/25/97~~ **September 25, 1997 and as last amended on (date),** which is incorporated herein by reference.

(2) the following classes of compounds will be analyzed as exempt compounds only if manufacturers specify which individual compounds are used in the product formulations and identify the test methods, which, prior to such analysis, have been approved by the Executive Officer of the ARB, and can be used to quantify the amounts of each exempt compound: cyclic, branched, or linear, completely fluorinated alkanes; cyclic, branched, or linear, completely fluorinated ethers with no unsaturations; cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and sulfur-containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

(c) Metal Content. The metal content of metallic aerosol coating products shall be determined by South Coast Air Quality Management District **(SCAQMD)** Test

Method ~~311~~ **318-95 "Determination of Weight Percent Elemental Metal in Coatings by X-ray Diffraction"** ~~**(SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual), June 1, 1991, after removal of the propellant following the procedure in ASTM Method D 5325-92, "Standard Test Method for Determination of Weight Percent Volatile Content of Water-Borne Aerosol Paints", November 15, 1992**~~ **, which is incorporated herein by reference**.

(d) Specular Gloss. Specular gloss of flat and non-flat coatings shall be determined by ASTM Method D 523-89, March 31, 1989**, which is incorporated herein by reference**.

(e) Acid Content. The acid content of rust converters shall be determined by ASTM Method D 1613-91, "Standard Test Method for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer, and Related Products, May 15, 1991, **which is incorporated herein by reference.** ~~**, after removal of the propellant following the procedure in ASTM Method D 5325-92, "Standard Test Method for Determination of Weight Percent Volatile Content of Water-Borne Aerosol Paints", November 15, 1992.**~~

(f) Lacquers. Lacquer aerosol coating products shall be identified according to the procedures specified in ASTM Method D 5043-90, "Standard Test Methods for Field Identification of Coatings," April 27, 1990**, which is incorporated herein by reference**.

NOTE: Authority cited: Sections 39600, 39601, 39607, 41511 and 41712, Health and Safety Code. Reference: Sections 39002, 39600, 39607, 40000, 41511 and 41712, Health and Safety Code.

INITIAL STATEMENT OF REASONS

# APPENDIX B

## PROPOSED MODIFIED ARB METHOD 310: Determination of Volatile Organic Compounds (VOC) in Consumer Products

California Environmental Protection Agency

Air Resources Board

METHOD 310

# DETERMINATION OF VOLATILE ORGANIC COMPOUNDS (VOC) IN CONSUMER PRODUCTS

**(Including Appendices A and B)**

Adopted: September 25, 1997 **and as last amended on (date)**

[Note: The text proposed for deletion is shown in **~~bold/strikeout~~** and the new text is shown in **bold/underline**.]. This revision proposes modifications to ARB Method 310 incorporated by reference in the consumer products regulation.

DISCLAIMER: Mention of any trade name or commercial product in Method 310 does not constitute endorsement or recommendation of this product by the Air Resources Board.

**METHOD 310**
**DETERMINATION OF VOLATILE ORGANIC COMPOUNDS (VOC) IN CONSUMER PRODUCTS**

## 1 APPLICABILITY

1.1 This method (Method 310) applies to the determination of the percent by weight of **(1)** volatile organic compounds (VOC) in consumer products, antiperspirant and deodorant products, and aerosol coatings products **as those terms are defined in Title 17, California Code of Regulations (CCR), Division 3, Chapter 1, Subchapter 8.5 (Consumer Products), commencing with section 94500**, **and (2) low vapor pressure-volatile organic compounds (LVP-VOC) as that term is defined in section 94508(a)(78).** ~~**as defined in Title 17, California Code of Regulations, Sections 94500 et seq.**~~

1.2 Method 310 determines the total volatile material in a product and the presence of any compounds prohibited by ARB regulations ("prohibited compounds"). Components of the product that do not meet the definition of a VOC or are exempted by ARB regulations for a specific product category ("exempt compounds") are subtracted from the total volatile material to determine the final VOC content for the product.

1.3 Method 310 does not apply to the determination of the composition or concentration of fragrance components ~~**or Low Vapor Pressure (LVP) compounds**~~ in products.

1.4 The term "Executive Officer" as used in this document means the Executive Officer of the Air Resources Board or his or her authorized representative.

## 2 TEST METHODS

Method 310 incorporates by reference the following American Society for Testing and Materials (ASTM), National Institute for Occupational Safety and Health (NIOSH), and United States Environmental Protection Agency (US EPA) analytical test methods:

2.1 ASTM D 2369-**97** ~~**87**~~: Standard Test Method for Volatile Content of Coatings **(July 10, 1997)** ~~**(June 10, 1987)**~~.

2.2 ASTM D 1426-93: Standard Test Methods for Ammonia Nitrogen in Water (September 15, 1993).

2.3 ASTM D 4017-**96a** ~~**88**~~: Standard Test Method for Water in Paints and Paint Materials by the Karl Fisher Titration Method **(July 10, 1996)** ~~**(October 31, 1988)**~~.

2.4 ASTM D 3792-**91** ~~**86**~~: Standard Test Method for Water Content of Water-Reducible Paints by Direct Injection Into a Gas Chromatograph **(May 15, 1991)** ~~**(November 28, 1986)**~~.

2.5 ASTM D 859-**94** ~~**88**~~: Standard Test Method for Silica in Water (determination of polymethylsiloxanes after digestion) **(May 15, 1994)** ~~**(August 19, 1988)**~~.

2.6 ASTM D 3074-**94** ~~**72**~~: ~~**(Reapproved 1998)**~~ Standard Test Methods for Pressure in Metal Aerosol Containers **(November 15, 1994)** ~~**(Approved July 28, 1972 and reapproved in 1988)**~~ with the modifications found in Appendix A.

2.7 ASTM D 3063-**94** ~~**79**~~: ~~**(Reapproved 1988)**~~ Standard Test Methods for Pressure in Glass Aerosol Bottles **(November 15, 1994)** ~~**(April 27, 1979 and reapproved in 1984)**~~ with the modifications found in Appendix A.

2.8 ASTM D 3064-89: Standard Terminology Relating to Aerosol Products (November 24, 1989).

2.9 NIOSH: Method 1400 Alcohols I (analysis of acetone and ethanol by gas chromatography). NIOSH Manual of Analytical Methods, Volume 1 (February 1984).

2.10 **Gas Chromatography/Mass Spectrometry for Volatile Organics (analysis of exempt and/or prohibited compounds in the product by headspace/gas chromatography/mass spectrometry)** ~~**US EPA Method 8240, September 1986 revision 0, Gas Chromatography/Mass Spectrometry for Volatile Organics (analysis of exempt and/or prohibited compounds in the product by headspace/gas chromatography/mass spectrometry), Test Methods for Evaluating Solid Waste, Volume 1 B: Laboratory Manual Physical Chemical Methods, SW-846, November 1986.**~~

**2.10.1 US EPA Method 8240B, September 1994, Revision 2, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Test Methods for Evaluating Solid Waste, Volume 1 B, Chapter 4, Section 4.3.2: Laboratory Manual Physical/Chemical Methods, SW-846, September 1994.**

**2.10.2 US EPA Method 8260B, December 1996, Revision 2, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Test Methods for Evaluating Solid Waste, Volume 1 B, Chapter 4, Section 4.3.2: Laboratory Manual Physical/Chemical Methods, SW-846, December 1996.**

2.11 US EPA Reference Method 24, Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings: 40 Code of Federal Regulations (CFR) Part 60, Appendix A, as it existed on July 1, 1994.

2.12 US EPA Reference Method 24A, Determination of Volatile Matter Content and Density of Printing Inks and Related Coatings: 40 CFR Part 60, Appendix A, as it existed on July 1, 1994.

2.13 US EPA Reference Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography: 40 CFR Part 60, Appendix A, as it existed on July 1, 1994.

2.14 US EPA Method 300.7, March, 1986. Dissolved sodium, ammonium, potassium, and calcium in wet deposition by chemically suppressed ion chromatography.

**2.15 ASTM D 86-96: Standard Test Methods for Distillation of Petroleum Products (April 10, 1996).**

**2.16 ASTM D 850-93: Standard Test Methods for Distillation of Industrial Aromatic Hydrocarbons and Related Materials (April 15, 1993).**

**2.17 ASTM D 1078-97: Standard Test Methods for Distillation Range of Volatile Liquids (July 10, 1997).**

**2.18 ASTM D 2879-97: Standard Test Method for Vapor-Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope (April 10, 1997) with the modifications found in Appendix B .**

## 3 TESTING PROCEDURE

3.1 The testing begins when the Executive Officer selects a consumer product sample for analysis by Method 310. The Executive Officer will maintain sample chain of custody throughout the selection and analytical process.

3.2 Initial Testing of Aerosol Products

If the sample is an aerosol product, the aerosol propellant is separated from the liquid portion of the product by using ASTM D 3074-**94** ~~**72**~~ (as modified in Appendix A for metal aerosol container) or ASTM D 3063-**94** ~~**79**~~ (as modified in Appendix A for glass aerosol container). The propellant portion is analyzed for exempt or prohibited compounds by using US EPA **Reference** Method 18. The remaining liquid portion of the product is then analyzed as specified in section 3.3.

3.3 Initial Testing of Non-Aerosol Products and the Liquid Portion of Aerosol Products

The liquid, solid, or gel product sample is analyzed to determine the total volatile material present in the sample and to determine the presence of any exempt or prohibited compounds. This analysis is conducted by performing the following tests:[2]

3.3.1 Gravimetric analysis of samples to determine the weight percent of total volatile material, using US EPA **Reference** Method**s** 24/24A, ASTM D 2369-**97** ~~**87**~~.

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[2] Alternate test methods may be used, as provided in section 6.0

3.3.2 Determination of sample water content. For determination of water content either ASTM D 4017-**96a** ~~**88**~~, or ASTM D 3792-**91** ~~**86**~~ may be used, or results from both procedures may be averaged and that value reported.

3.3.3 Determination of ammonium content using ASTM D 1426-93 or US EPA Method 300.7.

3.3.4 Determination of ketones and alcohol content using NIOSH **Method** 1400.

3.3.5 Analysis of exempt and prohibited compounds, if present (US EPA **Reference** Method 18, US EPA Method 8240**B**, **US EPA Method 8260B**, ASTM D 859-**94** ~~**88**~~, NIOSH **Method** 1400).

**3.3.6 If LVP-VOC status is claimed or the analysis indicates the presence of an LVP-VOC component and the percent VOC is not in compliance, the Executive Officer will request formulation data as specified in Section 3.5.2.**

3.4 Prohibited Compounds

If the sample is found to contain compounds prohibited by ARB regulations (i.e., ozone-depleting compounds) at concentrations equal to or exceeding 0.1 percent by weight, the Executive Officer will reanalyze the sample for confirmation.

3.5 Initial Determination of VOC Content

The Executive Officer will determine the VOC content pursuant to sections 3.2 and 3.3. Only those components with concentrations equal to or greater than 0.1 percent by weight will be reported.

3.5.1 Using the appropriate formula specified in section 4.0, the Executive Officer will make an initial determination of whether the product meets the applicable VOC standards specified in ARB regulations. If initial results show that the product does not meet the applicable VOC standards, the Executive Officer may perform additional testing to confirm the initial results.

3.5.2 If the results obtained under section 3.5.1 show that the product does not meet the applicable VOC standards the Executive Officer will request the product manufacturer or responsible party to supply product formulation data. The manufacturer or responsible party shall supply the requested information. Information submitted to the ARB Executive Officer may be claimed as confidential; such information will be handled in accordance with the confidentiality procedures specified in Title 17, California Code of Regulations, sections 91000 to 91022.

3.5.3 If the information supplied by the manufacturer or responsible party shows that the product does not meet the applicable VOC standards, then the Executive Officer will take appropriate enforcement action.

3.5.4 If the manufacturer or responsible party fails to provide formulation data as specified in section 3.5.2, the initial determination of VOC content under this section 3.5 shall determine if the product is in compliance with the applicable VOC standards. This determination may be used to establish a violation of ARB regulations.

**3.6 Determination of the LVP-VOC status of compounds and mixtures. This section does not apply to antiperspirant and deoderants or aerosol coatings products because there is no LVP-VOC exemption for these products.**

**3.6.1 Formulation data. If the vapor pressure is unknown, the following ASTM methods will be used to determine the LVP-VOC status of compounds and mixtures: ASTM D 86-96 (approved April 10, 1996), ASTM D 850-93 (approved April 15, 1993), ASTM D 1078-97 (approved July 10, 1997), and ASTM D 2879-97 (approved April 10, 1997, as modified in Appendix B to this Method 310).**

**3.6.2 LVP-VOC status of "compounds" or "mixtures." The Executive Officer will test a sample of the LVP-VOC used in the product formulation to determine the boiling point for a compound or for a mixture. If the boiling point exceeds 216° C, the compound or mixture is an LVP-VOC. If the boiling is less than 216° C, then the weight percent of the mixture which boils above 216° C is an LVP-VOC. The Executive Officer will use the nearest 5 percent distillation cut that is greater than 216° C as determined under 3.6.1 to determine the percentage of the mixture qualifying as an LVP-VOC.**

**3.6.3 Reference method for identification of LVP-VOC compounds and mixtures. If a product does not qualify as an LVP-VOC under 3.6.2, the Executive Officer will test a sample of the compound or mixture used in a products formulation utilizing ASTM D 2879-97, as modified in Appendix B to this Method 310, to determine if the compound or mixture meets the requirements of Title 17, CCR, section 94508 (78)(A).**

3.**7**6 Final Determination of VOC Content

If a product's compliance status is not satisfactorily resolved under section**s** 3.5 **and 3.6**, the Executive Officer will conduct further analyses and testing as necessary to verify the formulation data.

3.**7**6.1 If the accuracy of the supplied formulation data is verified and the product sample is determined to meet the applicable VOC standards, then no enforcement action for violation of the VOC standards will be taken.

3.**7**6.2 If the Executive Officer is unable to verify the accuracy of the supplied formulation data, then the Executive Officer will request the product manufacture or responsible party to supply information to explain the discrepancy.

3.**7**6.3 If there exists a discrepancy that cannot be resolved between the results of Method 310 and the supplied formulation data, then the results of Method 310 shall take precedence over the supplied formulation data. The results of Method 310 shall then determine if the product is in compliance with the applicable VOC standards, and may be used to establish a violation of ARB regulations.

## 4 CALCULATION OF VOC CONTENT

4.1 Aerosol Products

For aerosol products, the percent VOC content shall be calculated using the following equation:

$$\text{PERCENT VOC} = \frac{WL(TV - A - H - EL) + WP - EP}{WL + WP} \times 100\%$$

Where[3]:

WL = weight (gm) of liquid product excluding container and packaging

TV = weight fraction of non-propellant total volatile material (US EPA **Reference Methods** 24/24A, ASTM D 2369-**97** ~~**87**~~)

A = weight fraction of ammonia (as $NH_4$) in liquid (ASTM D 1426-93) or US EPA Method 300.7

H = weight fraction of water in liquid (ASTM D 3792-**91** ~~**86**~~ or ASTM D 4017-**96a** ~~**88**~~)

EL = weight fraction of exempt compounds in liquid (US EPA Method 8240**B**, **US EPA Method 8260B**, US EPA **Reference** Method 18, ASTM D 859-**94** ~~**88**~~, NIOSH **Method** 1400, **ASTM D 86-96, ASTM D 850-93, ASTM D 1078-97, ASTM D 2879-97, as modified in Appendix B to this Method 310. LVP-VOCs are exempted in accordance with section 94508(a)(78).**

WP = weight (gm) of propellant (ASTM D 3074-**94** ~~**72**~~ [as modified and include ASTM D 3064-89] or ASTM D 3063-**94** ~~**79**~~ [as modified and include ASTM D 3064-89])

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[3] Alternate test methods, as provided in 6.0, or appropriate approved methods from section 2.0 may be used.

EP = weight (gm) of exempt compounds in propellant (US EPA **Reference** Method 18)

4.2 Non-Aerosol Products

For non-aerosol products, the percent VOC content shall be calculated using the following equation:

$$\text{PERCENT VOC} = (TV - A - H - EL) \times 100\%$$

## 5 METHOD PRECISION AND ACCURACY

The precision of Method 310 was evaluated using seven representative products with known volatile organic compound (VOC) contents ranging from 6.2 to 81.2 percent VOC by weight. Each sample was divided into six portions, and each portion was separately analyzed to determine the VOC content. Based on the results of this analysis, the 95 percent confidence interval for Method 310 is 3.0 percent by weight (Wt/Wt%).

## 6 ALTERNATE TEST METHODS

Alternative test methods which are shown to accurately determine the concentration of VOCs or constituent components in antiperspirant/deodorants, consumer products, or aerosol coating products (or their emissions) may be used upon written approval of the Executive Officer.

# Method 310 - Appendix A

## PROPELLANT COLLECTION PROCEDURES

## 1 APPLICATION

The procedure applies to modify ASTM D 3074-**94** ~~**72**~~ and D 3063-**94** ~~**79**~~ to allow collection of the propellant for analysis and density measurement for metal aerosol containers and glass aerosol containers, respectively. These modified procedures also retain the aerosol standard terminology listed in ASTM D 3064-89. The aerosol product container is pierced and the propellant is bled into an evacuated manifold. After the manifold reaches atmospheric pressure, approximately 1 liter of the propellant is collected in a clean, evacuated Tedlar bag. For density measurement the propellant is collected into an evacuated 250 mL glass dilution bulb that has been weighed to the nearest 0.1 mg. After filling, the dilution bulb is re-weighed to determine the density of the propellant. Alternately, density may be determined using a Density/Specific Gravity Meter. The Tedlar bag with the propellant aliquot is taken to the laboratory for analysis.

## 2 LIMITATIONS

Nitrogen analysis: Nitrogen may be used as a component of the propellant system. Ambient air is 78 percent nitrogen and may be present as a contaminate in the system prior to sample collection. This is eliminated by completely evacuating the propellant collection system and sweeping out any connecting lines to the Tedlar bag with product before starting sample collection. This procedure will eliminate or reduce nitrogen contamination to less than 0.1% by weight of the sample and the analysis of the propellant gas will be unaffected.

## 3 APPARATUS AND MATERIALS

3.1 Propellant Collection System[4]: See Figure 1. The system was built from 1/4" stainless steel and Teflon tubing. The vacuum pump is of bellows diaphragm design.

3.2 Tedlar Bags, 1 liter, equipped with slip valve and septum

3.3 Density Measurement

3.3.1 250 mL gas dilution bulb

3.3.2 or, an Density/Specific gravity meter meeting the following minimum specifications:

3.3.2(a) Measurement Method: Natural Oscillation Type

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[4] The metal piercing adapter is available from Mid-West Screw Products, Inc., 3523 North Kenton Ave., Chicago, IL 60641. Interim Part Number: 8013A-3/4 Longer SS. The gasket is available from Alltech Associate 2051 Waukegan road, Deerfield, IL 60015, part number 80-16. The glass aerosol adapter is available from Modern Machine Ship, Inc. P.O. Box 826, 123 N. Hazel Street, Danville, IL 61832.

3.3.2(b) Range: 0 - 3 g/cm$^3$

3.3.2(c) Measurement Temperature Range: 4 C ~ 70 C.

3.3.2(d) Temperature Accuracy: +/- 0.02 C (10 C ~ 30 C) and +/-0.05 C (4 C ~70 C).

3.3.2(e) Temperature Control Accuracy: +/- 0.01 C.

3.3.2(f) Measurement Time: 1- 4 minutes.

3.4 Gas tight syringe, 100 l

3.5 Balance, capable of accurately weighing to 0.1 mg

3.6 Can Piercing Platform. See Figure 2 (metal cans) and Figure 3 (glass containers).

3.7 Platform Shaker, equivalent to Thermolyne M49125

## 4 PROCEDURE

4.1 Propellant Collection for Metal Aerosol Containers

4.1.1 Turn on vacuum pump, close valves and evacuate the system (see Figure 1).

4.1.2 Remove the valve actuator on the aerosol can and weigh can to the nearest 0.01 g. Invert the can into cork holding ring on the piercing apparatus, center and snug against the gasket. (Figure 2)

4.1.3 Connect Tedlar bag to output 2, evacuate bag and seal. Connect 250 mL glass dilution bulb to output 1, evacuate bulb and seal.

4.1.4 Slowly raise the hydraulic jack until the can is pierced. Record the pressure of the can.

4.1.5 Vent the can until the pressure is at about 25 psi. Collect the propellant in the Tedlar bag.

4.1.6 After the propellant is collected, close and remove the Tedlar bag and vent the remainder of the propellant.

4.1.7 Weigh the evacuated 250 mL bulb to the nearest 0.1 mg. Use gloves while handling the bulb. Connect the bulb to the Tedlar bag and open to fill the bulb. Close the valves and re-weigh the dilution bulb, record the weight gain and calculate the propellant density in gm/l.

4.1.8 After the flow ceases from the can, it is removed from the assembly and allowed to vent overnight. The can may be placed on a platform shaker to vent the remainder of the propellant.

4.1.9 Reweigh can to the nearest 0.01 gm and record weight loss (total gms propellant). The can may now be opened for analysis of the liquid product.

4.2 Propellant Collection for Glass Aerosol Containers

4.2.1 Turn on vacuum pump, close valves and evacuate the system (see Figure 1).

4.2.2 Connect Tedlar bag to output 2, evacuate bag and seal. Connect 250 mL glass dilution bulb to output 1, evacuate bulb and seal.

4.2.3 The gauge assembly is prepressurized in order to minimize product expulsion and system contamination.

4.2.4 Remove actuator from valve of the aerosol glass container, and weigh container to the nearest 0.01 gm.

4.2.5 With container in an inverted position place the valve onto the tapered adaptor. Bring the top plate down to the flat of the container and tighten the nuts. A cork ring may be required to stabilize the container.

4.2.6 Record pressure of container and vent until the pressure is approximately one-half of recorded pressure. Collect propellant sample into the Tedlar bag.

4.2.7 After the propellant is collected, close and remove the Tedlar bag and vent the remainder of the propellant.

4.2.8 Weigh the evacuated 250 mL bulb to the nearest 0.1 mg. Use gloves while handling the bulb. Connect the bulb to the Tedlar bag and open to fill the bulb. Close the valves and re-weigh the dilution bulb, record the weight gain and calculate the propellant density in gm/l.

4.2.9 Continue to vent container on the platform assembly overnight.

4.2.10 Remove container from platform and loosen valve assembly, do not remove valve assembly at this time.

4.2.11 Place container on a platform shaker to vent the remainder of the propellant.

4.2.12 Reweigh container and valve assembly to the nearest 0.01 gm and record weight loss (total gms propellant). The container may now be opened for analysis of the liquid product.

FIGURE 1

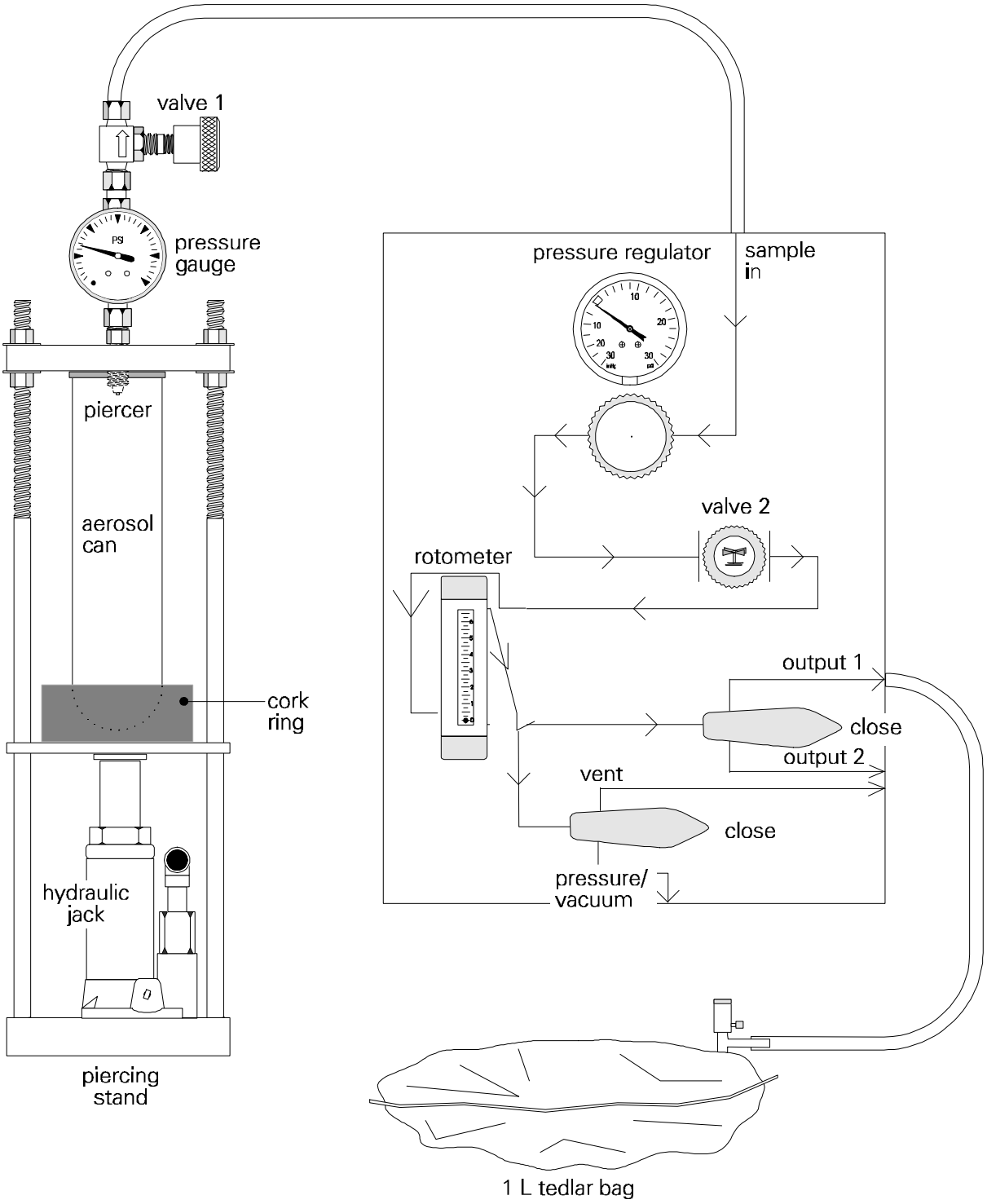
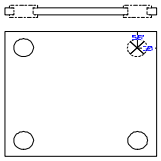
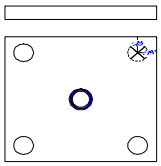

valve 1
pressure gauge
piercer
aerosol can
cork ring
hydraulic jack
piercing stand
pressure regulator
sample in
valve 2
rotometer
output 1
close
output 2
vent
close
pressure/ vacuum
1 L tedlar bag

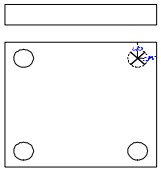
FIGURE 2



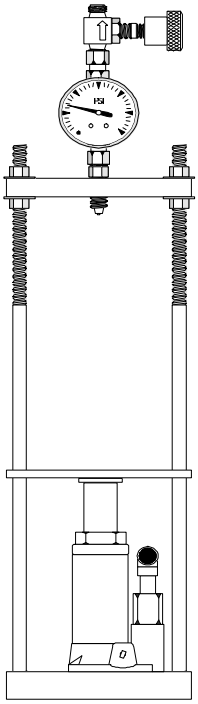
6" X 6" X 3/16" Steel Jack Plate
Center Holes 5/8" from edge
Drill 4 perimeter holes to allow
for a 1/2" bushing that works
with the smooth portion of the 1/2" rods
Tack weld the lift portion of the
hydraulic jack to the center of the plate
(weld while jack is fully extended as to
not damage it)



6" X 6" X 1/2" Aluminum Piercing Plate
Center holes 5/8" from edge
Drill 4 perimiter hole with 9/16" bit
Drill center holes with 7/16" bit
Tap center using 1/2 X 20 NF tap
Sample piercer is included to ensure
drill bit and tap size as center hole is
crucial to apparatus)



6" X 6" X 3/4" Aluminum Base Plate
Center holes 5/8" from edge
Drill 4 perimeter holes with 23/32" bit
Tap 4 perimeter holes with 1/2 X 13



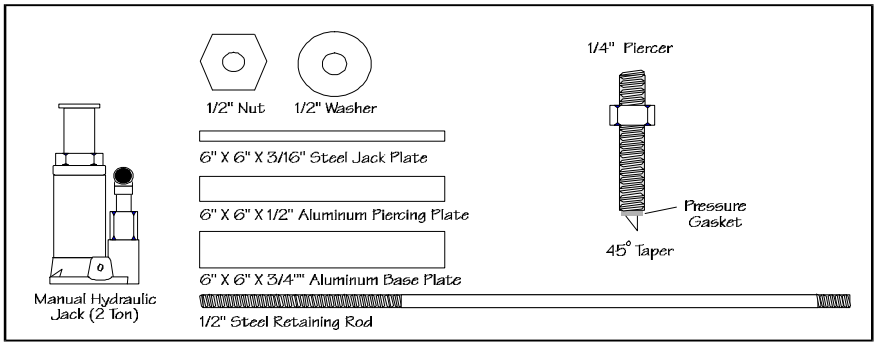
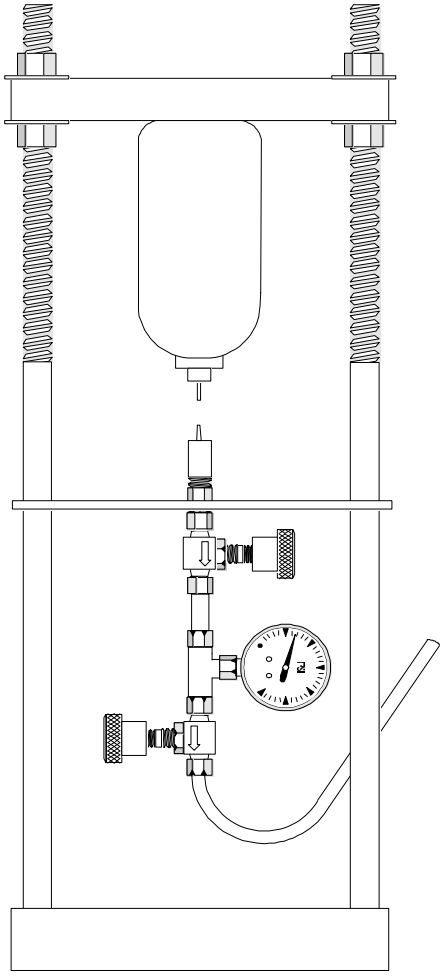


FIGURE 3



# Method 310 - Appendix B

## MODIFICATIONS to ASTM D-2879-97 (April 10, 1997)

**This procedure modifies ASTM D-2879-97 (April 10, 1997) as follows:**

**1. Modifications to the isoteniscope apparatus include:**

- **a. capacitance manometers and digital readout**
- **b. manifold system made of stainless steel and modified in design**
- **c. Ultra-torr fittings and Ultra-torr flex-lines**
- **d. ballast on the vacuum side of the isoteniscope manifold as depicted in ASTM D 2879-97 schematics, has been removed.**
- **e. stainless steel liquid nitrogen trap (Cold Trap)**
- **f. stainless steel high vacuum valves**
- **g. recirculating cooling system (required for extremely low pressure work only)**
- **h. diffusion pump (required for extremely low pressure work only)**
- **I. hot ion cathode vacuum gauges (required for extremely low pressure work only)**

**2. A purge and degassing procedure consisting of lower pressures and a liquid nitrogen bath replaces the step of lightly boiling the sample as outlined in ASTM D 2879-97**

**3. Purge and Degassing Cycle**

- **a. With the U-tube connected, the system is evacuated to approximately 1.0 mm Hg. This readily removes most of the higher volatility gases from the sample.**

- **b. The stainless steel, liquid nitrogen cold trap is filled. The manifold is now brought to approximately 300 mm Hg with the purified nitrogen, regulated through the needle valve.**

- **c. The isoteniscope tube is carefully placed into a Dewar of liquid nitrogen. The ½ atmosphere pressure of nitrogen prevents the sample from splashing while being frozen. After the sample freezes, the system is evacuated to 0.05 mm Hg.**

- **d. The U-tube is removed from the Dewar, secured and allowed to warm to room temperature. The U-tube bulb head should be angled so the dissolved gases will be readily evacuated as the frozen sample starts to melt. When gases build up, it may be necessary to tilt the U-tube to release the gases.**

- **e. Repeat the freeze and degass process once, reducing pressure each time to less than 0.05 mm Hg. After the sample has returned to room temperature, close valve #3. There should be minimal dissolved gases left once the frozen sample**

**starts to melt. Tilt the tube to release any gas pockets (if necessary). Do not push nitrogen into the evacuated space between the sample in the arm and the sample in the reservoir. At this point, if the sample is properly degassed, a "natural break" should form in the sample. This creates a vapor space as the liquid level in the bulb leg of the manometer falls to a quasi-equilibrium position, usually with the fluid level higher in the long manometer leg. If there is no pendulum effect, and the liquid level in the long leg of the manometer is significantly higher than the level in the short leg (> 2 mm), degassing is probably incomplete, and the degassing procedure should be repeated.**

## 4. Data Evaluation

**The regression based on the plot of Log P vs. 1/T as outlined in ASTM D 2879-97 has been removed and replaced with a nonlinear regression to generate the coefficients for an Antoine equation. The data analysis procedure assumes that the measured pressure is the sum of the compound's vapor pressure and a residual fixed gas pressure. The vapor pressure's dependence on absolute temperature is represented by an Antoine expression, and the fixed gas as pressure is directly proportional to absolute temperature as outlined in ASTM 2879. This leads to the model equations:**

$$P_{model} = P_{vapor} + P_{fixed-gas}$$

$$P_{model} = B0*10^{(B1/(T+B2))} + B3*T$$

**where T is the absolute temperature (K) and B0, B1, B2 and B3 are coefficients to be determined via a nonlinear regression which minimizes the sum of squares $(P_{meas}-P_{model})^2$ for all experimental data points. The vapor pressure at $20^o$ C is then calculated as:**

$$P_{vapor}(293.15\ K) = B0*10^{(B1/(293.15+B2))}$$

**With a set of pressure vs temperature measurements, the nonlinear regression can be performed using a statistical software packages. The following constraints are imposed to obtain meaningful Antoine equation coefficients for low vapor pressure samples:**

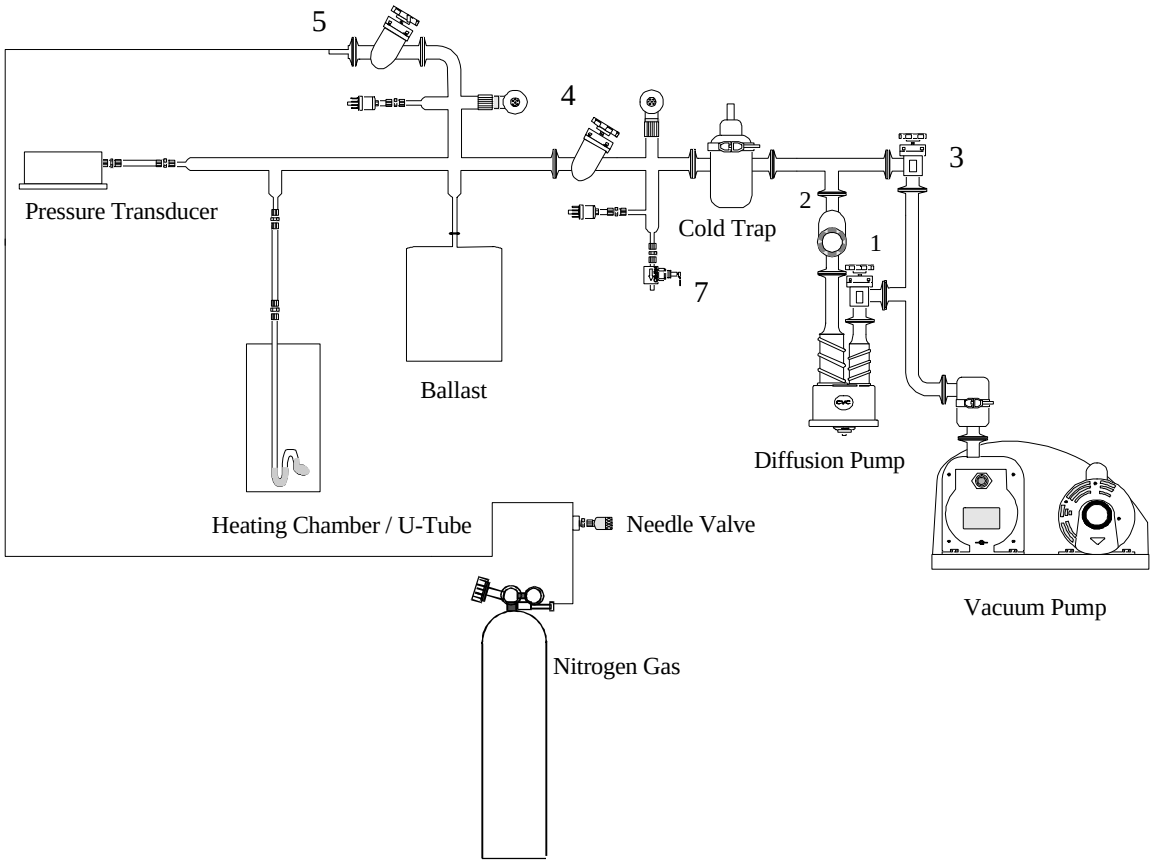
**a. Pressures shall be measured at temperatures ranging from room temperature to about $180^o$ C. Narrower ranges will not provide sufficient information to determine the Antoine curvature, i.e., B2 coefficient. Wider ranges can lead to experimental difficulties maintaining the vapor space in the isoteniscope. A minimum of 12 points is necessary to provide ample degrees of freedom for the calculations.**

**b.** **Initial pressures at room temperature shall be less than 1 mm Hg. Higher values are indicative of significant levels of dissolved fixed gases. These will vaporize during the course of the experiment as temperature is increased and invalidate the model's assumption for the fixed gas contribution.**

**c.** **-235 < = B2 < = 0. Positive values of B2 imply that the heat of vaporization of the substance increases with increasing temperature. Thermodynamic data for many compounds suggests this is unrealistic. Large negative values can lead to unrealistically low vapor pressure values coupled with excessive fixed gas contributions. The -235(K) bound is chosen to be consistent with literature values of B2 for many pure compounds. For hydrocarbons in the LVP-VOC range, B2 > = -100 provides reasonable agreement between measured and literature vapor pressures.**

**d.** **The fixed gas coefficient, B3, should normally be > = 0.**

Isoteniscope Vapor Pressure Measurement Apparatus



# INITIAL STATEMENT OF REASONS

# APPENDIX C

# PUBLIC COMMENTS

**From:** Bartos, Lynn (LT) <bartoslt@dow.com>
**To:** 'carb.barbara fry' <bfry@cleanair.arb.ca.gov>; 'carb.michael spears' <mspears@cleanair.arb.ca.gov>
**Date:** Wednesday, July 22, 1998 12:15 PM
**Subject:** comments from the LVP-VOC workshop

Michael, Barbara:

Thank you for your candor and open discussion at the workshop today and for allowing me to participate via conference call. There were a few additional comments I wish to make for your consideration:

1. I have asked Gabe Ruiz to provide raw data of the round robin results and any fitting constants which were used. It is possible that -- given the extrapolation required for both the isoteniscope and ebulliometry methods -- labs may have fit data differently which would alter the results and possibly the overall conclusions.

2. for the proposed LVP-VOC definition, I would suggest changing definition (78)(B) to read:
"(B) is a 'compound' with more than 12 heavy atoms, or a 'mixture' comprised solely of compounds' with more than 12 heavy atoms, and the vapor pressure is unknown..."
This definition would be therefore broadened to accommodate compounds other than hydrocarbons. "Heavy atoms" can be defined as all atoms other than H, He, Li, Be, B and F; alternatively, "heavy atoms" can be defined as all atoms with atomic weight greater than 12, except for fluorine. (Note that to our knowledge all "heavy atoms" increase the nbp at least as much as carbon, with the exception of fluorine; that is, fluorine is the only atom heavier than carbon that does not increase the normal boiling point as much as the carbon atom and would therefore not comply with the definition of a heavy atom.)

I welcome your comments back and thank you for your time!

Regards,

Lynn
The Dow Chemical Company
Oxygenated Solvents TS&D
> * (517)636-7909 *(517) 636-9573 *bartoslt@dow.com
>

**EXXON CHEMICAL COMPANY**

EXXON CHEMICAL

Basic Chemicals and Intermediates Technology
**F.M. Benitez**
MANAGER, INTERMEDIATES TECHNOLOGY

August 4, 1998
98PPIT T0718

**Comments on Consumer Products Test Methods And Regulations**

Mr. Michael Spears
State of California Air Resources Board
Monitoring and Laboratory Division
600 North Market Boulevard
P. O. box 2815
Sacramento, CA 95812-2815

Dear Michael:

I have reviewed the material developed for the Consumer Products Workshop on Test Methods and Regulation. The overall approach appears scientifically sound with reasonable flexibility for practical implementation. Several sections of the methods and regulations could benefit from minor revisions to correct typos, update references, and improve the clarity of the language. Specific comments and suggestions are detailed below.

*REGULATIONS, SECTION 3.6.1 and METHOD 310, SECTIONS 2.15-2.16*

References to ASTM D86-93 and ASTM D1078-93 can be updated to later revisions. I found ASTM D86-96 and ASTM D1078-97 at our library. The D86-96 revision is particularly useful since it includes precision data for automated instruments. The ASTM 850-93 and ASTM 2879-97 appear to be the most recent.

*METHOD 310 - APPENDIX B*
*MODIFICATIONS TO ASTM D2879-97*

- In Section 1.1e, "defusion" should be "**diffusion**"

O:RMK:1998:T0718
P.O. Box 5200, Baytown, TX 77522-5200
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A Division of Exxon Corporation

- In Section 4, "1 °C" should be "**1 °C/minute**"

- In the first part of Section 6, "with nonlinear" should be "**with a nonlinear**", "g as" should be "**gas**", all "±" should be "**+**", and "performed a statistical" should be "**performed by a number of statistical**"

- Section 6c combines two concepts that should be separate. The last sentence of this section should be replaced with **"The - 235(K) bound is chosen to be consistent with literature values of B2 for many pure compounds as suggested in ASTM D1719. For hydrocarbons in the LVP-VOC range, B2 ≥ -100 provides reasonable agreement between measured and literature vapor pressures. "**

- A new Section 6d should read **"The fixed gas coefficient, B3, should normally be ≥ 0."**

- A future section should address the precision and accuracy of the isoteniscope method, particularly related to statistical requirements necessary to prove a compound is not a LVP-VOC.

*DRAFT MLD SOP ES08*

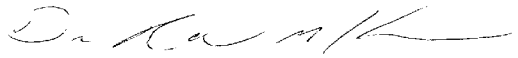
- Section 1e, " defusion" should be **"diffusion"**

- Section 4.11 is no longer needed

- Sections 7.3 and 7.4 should be the same as Sections 6c and 6d in Method 310, Appendix B as revised in this note

It has been a pleasure participating in various aspects of the LVP-VOC test methods project, and I appreciate the cooperation shown by the entire MLD Consumer Products Group throughout.

Very truly yours,



Dr. Ralph M. Kowalik

cc: J. S. Catanach
J. M. Reynolds

O:RMK:1998:T0718

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

August 18, 1998

William V. Loscutoff
Chief, Monitoring and Laboratory Division
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812-2815

Re: Comments to Proposed Amendments to the Test Methods Sections of the Consumer Products Regulations

Mr. Loscutoff:

Thank you for the opportunity to comment on the proposed amendments to the test methods sections of the Consumer Product Regulations dated June 19, 1998.

EPA Region IX has the following comments on the test methods sections and on test method 310. These comments are divided into three parts. The first part contains comments regarding the approvability of the modifications into the state implementation plan (SIP). The second part contains general comments to ensure the accuracy of the test methods. The third part contains general editorial comments to improve the test methods.

## SIP APPROVABILITY ISSUES

**Executive Officer's Discretion**

1. Section 94506(a)(1) Test Methods
The last sentence of this paragraph should be modified as follows: "Alternative methods which are shown to accurately determine the concentration of VOCs in a subject product or its emissions may be used upon approval of the Executive Officer and EPA."

2. Test Method 310 Section 6
Section 6 provides that alternative test methods which are shown to accurately determine the concentration of VOCs or constituent components may be used upon written approval of the Executive Officer. Written approval from the EPA should also be required if this test method is to be referenced in a SIP approved rule or regulation.

**EPA review of ASTM methods**

Some ASTM/NIOSH test methods are cited within ARB Method 310 that have not been previously reviewed by EPA for use in SIP approved rules and regulations. If Method 310 is to be referenced in a SIP approved rule or regulation, then the ASTM/NIOSH methods will also need to be submitted for review. The ASTM/NIOSH test methods should be submitted with a

test method submittal form prior to, or at the same time that Method 310 is submitted to the EPA for approval into the SIP. The ASTM/NIOSH methods that have not been previously reviewed by EPA include, but are not limited to:

ASTM D 1426-93: Standard Test Methods for Ammonia Nitrogen in Water (Sept 15,1993).
NIOSH: Method 1400 Alcohols I (analysis of acetone and ethanol by gas chromatography).
NIOSH Manual of Analytical Methods, Volume 1 (February 1984).

**ACCURACY OF TEST METHODS**

The conclusion section of the draft round robin report dated June 16, 1998 states that the "isoteniscope results showed a moderate degree of variability and sometimes very high differences from the literature vapor pressure values". The report further states that ebulliometry, on the other hand, showed considerable differences between laboratories, but that results from two of the three laboratories demonstrated high levels of precision and accuracy.

The LVP fraction determination by initial boiling point also showed significant differences in the results from the gas chromatograph (GC) and ASTM D86 methods. The ASTM method appeared to provide greater accuracy of the two methods whereas the GC method consistently resulted in lower initial boiling points than published literature values.

CARB should take action to correct findings identified in the round robin report to improve the accuracy of the test methods prior to adopting the methods for general use under the consumer products regulation. These actions include not performing the isoteniscope method on hydroscopic samples and not allowing the use of initial boiling point by gas chromatography simulated distillation due to a negative bias.

**EDITORIAL COMMENTS**

1. Title 17, Sections 94506, 94515 and 94526: Test Methods
   Paragraph (a)(2) 3.5.2, second line - change "." to "," after "standards".

2. SOP ES08, Section 6.2.f: Sample Preparation
   Recommend labelling point "A" in figure 12 or referring the reader to figure 4 for the location of point "A".

3. SOP ES08 Figure 5
   Recommend labelling additional points described in paragraph 4.3 that do not appear in the figure (e.g., points E,J,K,$T_1$,$T_2$ as applicable)

4. SOP ES08 page 23
   Change "To Evaluate Date:" to "To Evaluate Data"

5. SOP ES09 Revision History Page; Revision 2, second line
   Change "analysis, is LVP-VOC if suspect" to "analysis, if LVP-VOC is suspect"

6. SOP ES10, page 2, section 5.1
   Please confirm side arm distillation flask is 126 ml (vs 125 ml)

Thank you again for the opportunity to provide comments on the consumer products test methods. If you have any comments or questions, please contact me at 415-744-1185, or Stanley Tong of my staff at 415-744-1191.

Sincerely,

Andrew Steckel
Chief, Rulemaking Office

cc:
George Lew, Chief, Engineering and Laboratory Branch
Michael Spears, Manager Evaluation Section